

transport system that would carry the pulverized switchgrass to the OGS burner. At the burner, the pulverized switchgrass would be injected through nozzles into the burner, where it would be co-fired with pulverized coal.

2.1.3 Decommissioning

Decommissioning would entail the dismantling and disposal of the switchgrass storage barn and process building constructed under the Proposed Action. This would be necessary if switchgrass operations were determined to be economically, technically, or environmentally infeasible. Similarly, decommissioning would be required when the OGS reached the end of its life cycle. If, in the short term, it were decided that the project was not feasible, dismantling and removal of the onsite additions would be negotiated among DOE, Alliant Energy, and the Chariton Valley RC&D. Alliant might request restoration of the property to its original condition. The owner of the existing onsite switchgrass storage barns, Prairie Lands Bio Products, Inc., would retain ownership of the barns and would be responsible for their disposition. DOE would have the option of recovering the equipment and buildings it paid for and installed under the Proposed Action. Alternately, DOE could opt to sell them to Alliant Energy, or to another party, or to contract for their removal and disposal. Regardless of which short-term decommissioning option would be selected, it would not require a shutdown or any disruption of OGS's normal operations or pose significant permitting obstacles.

If switchgrass co-fire operations proved to be economically, technically, and environmentally feasible and were fully integrated into OGS's normal operations by Chariton Valley RC&D and Alliant Energy, decommissioning of the onsite switchgrass storage and process buildings constructed under the Proposed Action at the OGS plant would be integrated into the decommissioning and closure plans for the whole OGS plant at the end of its life cycle.

2.2 No Action Alternative

For NEPA compliance purposes and for the purposes of analyzing a meaningful "no action" scenario, DOE has assumed that Chariton Valley RC&D and Alliant Energy would abandon the plans for Phase 2 and Phase 3 co-fire infrastructure construction and ancillary activities if DOE funding were not forthcoming. Under this scenario, DOE assumes that the existing switchgrass storage and processing facilities would be demolished or converted to other uses. However, DOE recognizes that Chariton Valley RC&D and Alliant Energy, at their discretion, could opt to pursue the project independently or to seek alternate sources of funding if DOE decided not to fund the Proposed Action.

3.0 EXISTING ENVIRONMENT

To assess the potential impacts under the Proposed Action, DOE first determines the condition of the environment as it currently exists. This section characterizes the existing environment; Section 4.0 assesses the potential impacts that could occur under the Proposed Action.

3.1 Air Quality and Meteorology

3.1.1 Air Quality

The National Ambient Air Quality Standards (NAAQS) established by the U.S. Environmental Protection Agency (EPA) and subsequently adopted as the Iowa Ambient Air Quality Standards define the allowable concentration of criteria air pollutants that may be reached but not exceeded in a given time period. These standards were established to protect human health (primary standards) and welfare (secondary standards) with a reasonable margin of safety. The criteria pollutant standards establish maximum concentrations for ozone, carbon monoxide, nitrogen oxides, sulfur dioxide, lead, and particulate matter with a diameter of 10 microns or less (PM₁₀). Ozone is formed by the photo-oxidation of reactive

hydrocarbons in the presence of nitrogen oxide. Emissions of volatile organic compounds (VOCs) that participate in atmospheric photochemical reactions also result in ozone formation.

As of May 2003, all 99 counties in Iowa were in attainment status and in compliance with the NAAQS. The OGS is about 56 kilometers (35 miles) north of the Missouri state line. All of the counties in northern Missouri are also in attainment status and in compliance with the NAAQS (EPA 2003). Because the Proposed Action would not be implemented in criteria air pollutant nonattainment or maintainance areas, a Clean Air Act (CAA) conformity determination is not required.

In areas that are in attainment status, the maintenance of air quality is mandated by the Prevention of Significant Deterioration (PSD) provisions of the CAA (PROACT 2000). In general, these provisions include (1) a permit review process applicable to the construction and operation of new and modified stationary sources in attainment areas, (2) a requirement that a new source obtain a preconstruction permit demonstrating that the source will implement the required technologies to control future emissions of pollutants, and (3) a demonstration that the new source will not exceed the PSD increment (that is, the maximum increase in concentration that is allowed to occur above the baseline concentration for a pollutant).

The OGS operates under continuing provisions of Title V Air Quality Operating Permit Number 98-TV-009-M005 issued by the Iowa DNR (DNR 2002a).¹ Phase 1 switchgrass co-fire testing (November 2000 through January 2001) was conducted under an air quality operating permit variance issued by the Iowa DNR to allow for initial use and testing of switchgrass as a biomass co-fire feedstock. The Iowa DNR has stated that it fully supports proceeding with the project through Co-fire Test 2, and that after Co-fire Test 2, both the Iowa DNR and the CVBP will be in a better position to identify the appropriate permitting path going forward (DNR 2002b). However, a modification to the operating permit would be required if Phase 3 (full-scale commercial co-fire operations) were authorized and undertaken.

3.1.2 Meteorology

In general, Iowa has a humid continental climate and experiences extremes in both temperature and precipitation, as well as a potential for violent storms such as tornadoes, blizzards, and thunderstorms. From 1971 to 2000, the average annual high and low temperatures at Ottumwa Industrial Airport were 15.7 degrees Celsius (°C) (60.2 degrees Fahrenheit [°F]) and 5.4 °C (41.8 °F), respectively. During the same period, January low temperatures averaged -10.1 °C (13.8 °F) and July highs averaged 30.1 °C (86.2 °F). Summertime high temperature can reach into high 30 °C readings (more than 100 °F), accompanied by high humidity. In some years, periods of extended hot, humid conditions stress both crops and livestock. Extremely cold winter temperatures also occur periodically.

Precipitation, usually occurring when moist air from the Gulf of Mexico meets colder air from the Pacific or Arctic, averaged 91.2 centimeters (35.9 inches) annually at Ottumwa Airport from 1971 to 2000. May, June, and July are the wettest months, each averaging approximately 11.4 centimeters (4.5 inches) of rain as recorded at Ottumwa Airport from 1971 to 2000. However, the precipitation can be highly variable, with large amounts falling at once or with long periods between precipitation events. The region is susceptible to floods, droughts, blizzards, and tornadoes.

¹ This permit expired on December 31, 2002, but continuing plant operations under this permit are authorized under the umbrella of Alliant Energy's application for renewal of the permit, which is currently being reviewed by the Iowa DNR.

Seventeen tornadoes have been reported in Wapello County, Iowa, between 1950 and 1998 (Tornado Project 1999). This statistic indicates there is a low probability that a tornado would occur near the OGS and a very low probability that the plant would be struck by one.

Chariton Valley RC&D has reported the following climate data for the OGS site (Alliant Energy et al. 2002):

- Average wind velocity: 20.5 kilometers per hour (12.7 miles per hour)
- Maximum recorded temperature: 40 °C (104 °F)
- Minimum recorded temperature: -33 °C (-31 °F)
- Highest monthly average: 24.4 °C (75.9 °F)
- Lowest monthly average: -4.9 °C (23.1 °F)

3.2 Soils and Geology

3.2.1 Soils

The Chariton River watershed covers 3,000 square kilometers (1,160 square miles) of the southern Iowa drift plain, a land region that extends across 60,000 square kilometers (23,000 square miles) of southern Iowa as well as northern Missouri and eastern Nebraska and Kansas (Prior 1991). Its landscape is characterized by rolling uplands and occasional broad alluvial plains. The lengthy and complex glacial and climatic history resulted in areas of prairie, forest, and savanna being present at the time of European-style settlement. Common features of the upland soils in the watershed include their being poorly drained and having vertic characteristics (Molstad 2000). Most alluvial soils in the area are mollisols, although they tend to be somewhat coarser textured and better drained than their contiguous upland counterparts.

Diversified farming has been the norm in the Chariton River watershed since around 1860. Common crops during the late 20th century were corn, soybeans, a variety of cool season forages and pasture species, and woodlots. The main limitations to crop production are steep, erosive landscapes; clayey soils that alternate between being too wet and too dry; and acidic subsoils. These limitations resulted in a large proportion (about 12 percent) of the watershed being enrolled in the Conservation Reserve Program (CRP), and many areas being planted to switchgrass during the 1980s and 1990s to improve productivity and conserve soil (Burras and McLaughlin 2002).

3.2.2 Geology

A new bedrock geologic mapping of south-central Iowa produced with the assistance of the U.S. Geological Survey (USGS) incorporates all available sources of bedrock information for the region (Pope et al. 2002). South-central Iowa is largely covered by a mantle of Quaternary deposits of various thickness, although extensive areas of shallow bedrock and bedrock exposure are also found due primarily to a relatively mature stream and river drainage system which has

CONSERVATION RESERVE PROGRAM

The USDA Farm Service Agency's (FSA's) Conservation Reserve Program (CRP) is a voluntary program available to agricultural producers to help them safeguard environmentally sensitive land. Producers enrolled in the CRP plant long-term, resource-conserving crops or covers to improve the quality of water, control soil erosion, and enhance wildlife habitat. In return, the FSA provides participants with rental payments and cost-share assistance. Contract duration is between 10 and 15 years. The Food Security Act of 1985, as amended, authorized the CRP. The program is governed by USDA regulations published in Title 7 CFR, Part 1410, and is implemented by the FSA on behalf of USDA's Commodity Credit Corporation.

exhumed and exposed the underlying bedrock in some places. In the study area, bedrock exposure is generally limited to a few stream or river valleys in each county. Quaternary deposits in south-central Iowa are dominated by glacial till (diamicton) with lesser volumes of loess across the Southern Iowa Drift Plain, the Iowa landform where the study area is located.

USGS information on historic Iowa earthquakes indicates that the area is relatively stable seismically. Only 12 earthquakes with epicenters in Iowa are known to have occurred in historic times. The first known earthquake occurred in 1867 near Sidney in southwest Iowa; the most recent occurred in 1948 near Oxford in the east-central part of the state. The largest known earthquake (Mercalli scale magnitude VI) occurred near Davenport in southeast Iowa in 1934.

Site-Specific Characteristics. Allender Butzke Engineers, Inc. conducted geotechnical explorations on the proposed new construction site for Alliant Energy. Their 2002 report, which is based in part on four soil borings to depths of 8 meters (25 feet), indicates an expectation that stiff to very stiff fill, capable of providing adequate floor slab and foundation support for the proposed lightly loaded structures, was placed and compacted under the proposed new construction site in a controlled manner during original plant construction (Allender Butzke 2002). However, without additional background information or documentation on the fill, uncertainties regarding the support capabilities of the underlying fill would remain unanswered. To address this uncertainty, the report recommends that extensive geotechnical probing, testing, and observations be conducted during site preparation and foundation excavation to further evaluate the suitability of the fill soil and also recommends specific engineering remedies if unsuitable fill conditions are encountered. Three of the four borings did not result in observed groundwater immediately after drilling. One drilling resulted in observed groundwater at 7 meters (23 feet) below grade. However, loess formation coloring suggests past influsions of groundwater to shallower levels. In the past, the depth to groundwater may have been as shallow as 1 meter (3 feet) due to variations in seasonal rainfall, drainage, topography, irrigation, and groundcover.

3.3 Biological Resources

The term “biological resources” refers to the animal and plant species resident to an area and to their supporting habitat. The term generally does not refer to agricultural species. Special concern is afforded to species whose reproductive populations are dwindling and which are in danger of local and possibly global extinction. Federal and state lists of endangered, threatened, and sensitive species are updated regularly for each county of the United States. Should threatened or endangered species be found to be adversely impacted by a proposed action, mitigation measures must be implemented under consultation with the appropriate agencies.

3.3.1 Common Species

Biological resources near the OGS have been disturbed due to plant construction, which started in 1976, and from plant operations, which have been ongoing since 1981. The location where the proposed new facilities would be constructed on the OGS plant is an old parking lot currently used for storage and is essentially devoid of vegetation resources. However, wildlife is present around the plant. Ducks, Canada geese, deer, turtles, seagulls, foxes, and coyotes visit the plant site. The Rathbun Lake watershed affords substantial wildlife and botanical habitat on and in the lake and on the adjacent land, which includes 85 square kilometers (21,000 acres) of public land. The 45-square-kilometer (11,000-acre) Rathbun Lake supports numerous sport fish, including crappie, channel catfish, walleye, and largemouth bass. The Rathbun Fish Hatchery raises channel catfish, walleye, saugeye (a hybrid walleye/sauger cross) and largemouth bass. Fish produced at the Rathbun Hatchery are stocked statewide.

Ongoing field research supported by CVBP partner organizations is characterizing biological resources associated with Chariton Valley switchgrass test plots. The field work has included nest searches,

breeding bird surveys, placement and monitoring of artificial nests, and vegetation measurements in biomass fields. This research is yielding a current inventory of wildlife, especially birds, in the Rathbun Lake watershed. Forty-seven species of breeding birds were observed; the five most common were common yellowthroat, barn swallow, grasshopper swallow, red-ringed blackbird, and song swallow. Other observed species included ring-necked pheasants, horned lark, sedge wren, vesper sparrow, brown-headed cow-bird, killdeer, dickcissel, meadowlarks, and field sparrows.

3.3.2 Listed Species

The FWS lists five endangered or threatened species (one bird species, three plant species, and one bat species) that have been collected in Wapello County and six nearby counties, portions of which make up the Rathbun Lake watershed (Table 2).

Table 2. Federally Listed Species in Wapello County and Six Iowa Counties Potentially Impacted by the Proposed Action^a

County	Common Name	Scientific Name	Status ^b
Appanoose	Bald eagle	<i>Haliaeetus leucocephalus</i>	T
	Indiana bat	<i>Myotis sodalis</i>	E
Clarke	Indiana bat	<i>Myotis sodalis</i>	E
	Prairie bush clover	<i>Lespedeza leptostachya</i>	T
	Mead's milkweed	<i>Asclepias meadii</i>	T
Decatur	Indiana bat	<i>Myotis sodalis</i>	E
	Mead's milkweed	<i>Asclepias meadii</i>	T
	Eastern prairie fringed orchid	<i>Platantheia leucophaea</i>	T
	Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Lucas	Indiana bat	<i>Myotis sodalis</i>	E
	Bald eagle	<i>Haliaeetus leucocephalus</i>	T
	Prairie bush clover	<i>Lespedeza leptostachya</i>	T
Monroe	Indiana bat	<i>Myotis sodalis</i>	E
Wapello (OGS site)	Indiana bat	<i>Myotis sodalis</i>	E
	Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Wayne	Indiana bat	<i>Myotis sodalis</i>	E

a. Source: FWS 2001.

b. T = threatened, E = endangered

In response to DOE's request for an opinion regarding the presence of critical habitat, the FWS confirmed that the federally threatened bald eagle (*Haliaeetus leucocephalus*) and endangered Indiana bat (*Myotis sodalis*) are known to occur in Wapello County, Iowa, but that habitat for the bald eagle and the Indiana bat does not appear to occur on the project site (FWS 2003). Also, the Iowa DNR searched records of the project area and found no site-specific records of rare species or significant natural communities (DNR 2003).

3.4 Water Resources

The major water aquatic resources potentially impacted by the Proposed Action are the lower Des Moines River, riparian and wetland areas in the Rathbun Lake watershed, and Rathbun Lake.

Lower Des Moines River. The OGS main plant building is approximately 1 kilometer (0.6 mile) from the Des Moines River, the largest river in interior Iowa, and is approximately 16 kilometers (10 miles)

upstream from Ottumwa, the largest population center on the lower Des Moines River and the only population center that uses it as a primary source of drinking water. The river begins to flow (ice-out) in early to mid-April but is nearly dry by late September. From Chillicothe to its confluence with the Mississippi River at Keokuk, the river meanders lazily for about 160 kilometers (100 miles) through land that varies from flat agricultural bottomland to high bluff sandstone outcroppings. The river has few rapids, none of which are more difficult than Class I. It is valued as a recreational resource.

The Des Moines River floods every spring. Figure 9 shows the location of the OGS in relation to the 100-year floodplain of the Des Moines River and Avery Creek (HUD 1977).

The OGS operates under the water discharge pollutant concentration provisions of Iowa National Pollutant Discharge Elimination System (NPDES) permit # 900101 (EPA Number IA0060909), which was issued and is monitored by the Iowa DNR. River water intake limits are established by the provisions of Iowa DNR permit number 4851-R2, which authorizes OGS to withdraw river water in the

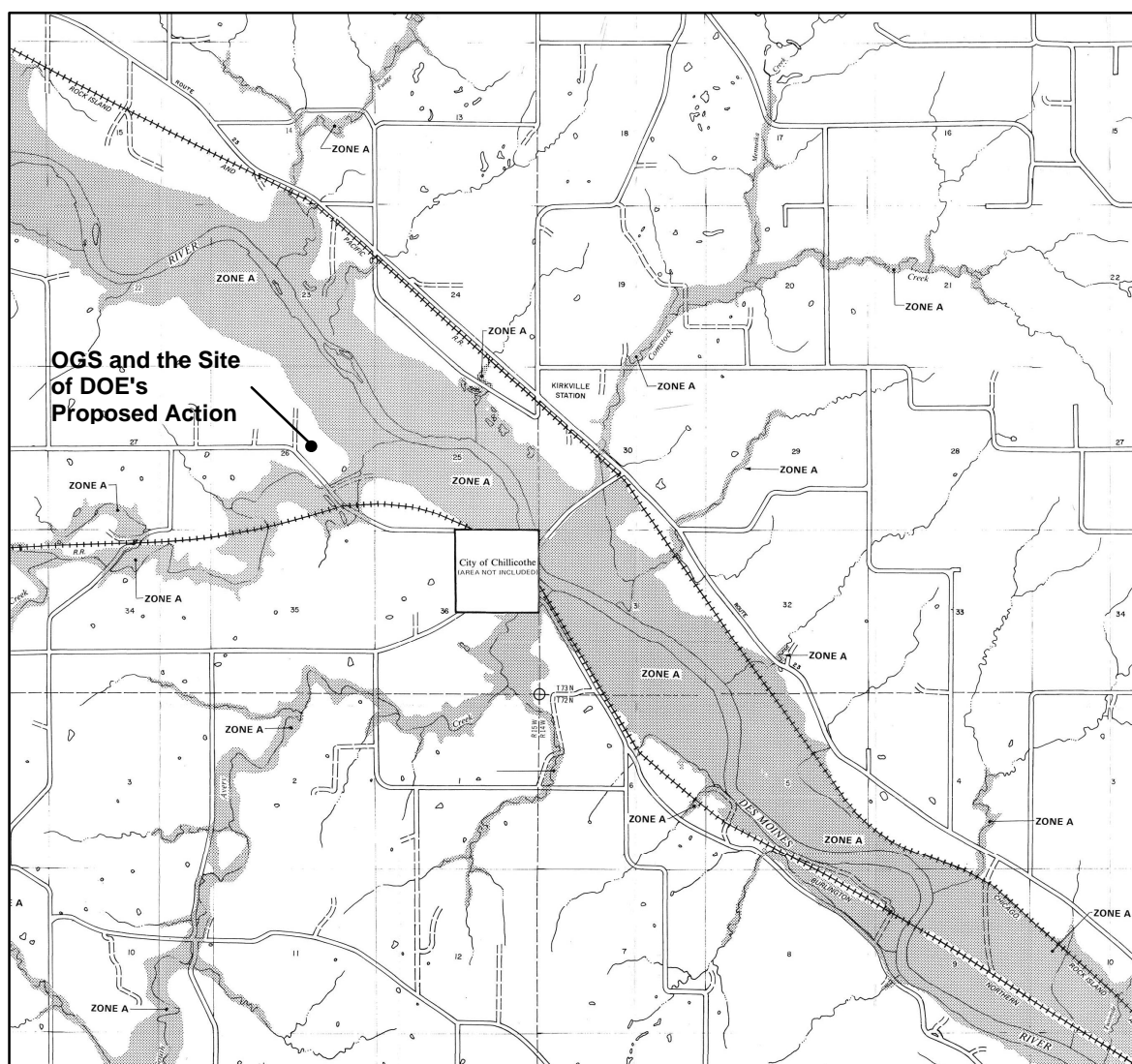


Figure 9. Proposed Location of New Facilities in Relation to 100-Year Floodplain

“maximum quantity of 12,464 acre-feet per year (4 billion gallons/year) at a maximum rate of 20 cubic feet per second.” Current usage is approximately 2 billion gallons per year. The plant’s two cooling towers and closed-cycle system design result in only a very small volume of water being returned to the river, none of which is heated.

Riparian and Wetland Areas. The Chariton and Des Moines Rivers are among the major streams and watersheds in the Southern Drift Plain landform region. Streams have had time to establish well-connected drainage systems that cut deeply into the land surface. Many finely etched rills give way to ravines, then to creeks that flow part of the year, and eventually to perennial streams and rivers in major valleys, including the Chariton. Glacial deposits in this region typically have a high clay content, which aids in building farm ponds and artificial lakes. Common wetland and riparian communities in the region include wooded ravines, floodplain and stream-side woodlands, and artificial lakes and ponds. National Wetlands Inventory data show that the predominant wetlands and riparian areas in the Southern Iowa Drift Plain region are palustrine forested (39 percent), palustrine emergent (18 percent), lacustrine unconsolidated bottom (15 percent), and palustrine unconsolidated bottom (15 percent). The proposed new facilities would not be constructed on or near wetlands.

Rathbun Lake. Rathbun Lake is a 45-square-kilometer (11,000-acre) reservoir located on the Chariton River within Wayne County in southeast Iowa. It was constructed in the 1970s by the U.S. Army Corps of Engineers (ACE) to provide flood protection. The lake has become a valuable recreation resource and boon to the economy of southeast Iowa. It also provides a reliable source of drinking water to more than 60,000 residents in Iowa and Missouri. Due to its location inside a watershed that largely supports row crop agriculture, the water quality of the lake is threatened by agricultural runoff, and its use as a flood impoundment is hindered by siltation rates that are now three times higher than the ACE originally predicted would occur.

3.5 Solid Waste

Fly ash, bottom ash, and economizer ash are the major solid wastes that result from OGS plant operations. The plant generates approximately 20 tonnes (23 tons) per hour of fly ash, 4.5 tonnes (5 tons) per hour of bottom ash, and lesser amounts of economizer ash. Fly ash is a light-weight, airborne ash that is produced when coal or other combustion feedstocks are burned in the plant boiler. It is actually more of a commodity than a waste and is essential to the economic viability of the plant. An electrostatic precipitator removes more than 99 percent of the fly ash from the flue gas stream. Most of the recovered fly ash is sold as an additive that enhances the plasticity and strength of concrete. The American Society of Testing and Materials (ASTM) has established a standard (ASTM C618-01) that specifies the physical and chemical properties of fly ash for use as a cement additive (ASTM 2001).

Fly ash that is not sold as a concrete additive is processed onsite into C-Stone®, a proprietary material used as construction fill or paving material. Recovered fly ash is stored onsite in silos until it is sold and shipped offsite, or until it is processed into C-Stone®, sold, and shipped offsite.

3.6 Infrastructure

Site Utilities. Power for the proposed new facilities would come from the main 13.8-kilovolt (kV) switch box service located at the southeast side of the main plant. A buried power line currently runs to an abandoned substation and would be reused for the new facility if possible. Another power line connection is available near the southeast side of the existing storage barn.

A possible connection to an existing 10-centimeter (4-inch) sanitary sewer line and a 5-centimeter (2-inch) non-potable water line is available near an abandoned guard house about 120 meters (400 feet) northeast of the proposed process building. No potable (drinking) water is available near the proposed

new facilities. The closest fire hydrant is located about 120 meters (400 feet) from the southeast corner of the proposed storage barn.

No natural gas service is available. Steam heat is available from the existing boiler; the closest connection point is about 210 meters (700 feet) from the proposed process building.

Transportation. The OGS site and the agricultural lands surrounding Rathbun Lake have a well-developed transportation infrastructure. The Burlington and Northern Railroad supplies coal directly to the plant. Ottumwa Municipal Airport is about 16 kilometers (10 miles) from the plant. State and county roads currently support offsite transportation of fly-ash, C-Stone®, and resold coal. A county road, Power Plant Road, passes within a few hundred yards of the site of the proposed new facilities. A 1998 study by the Iowa Department of Transportation (DOT) indicated peak traffic volume along Power Plant Road of 700 vehicles per day (DOT 1998).

Fire Protection. In addition to OGS's internal fire safety systems and programs, firefighting protection at the plant is provided by the full-time, 24-hour Ottumwa Fire Department and the volunteer Wapello County Fire Department. Both of these fire departments are located in Ottumwa about 13 kilometers (8 miles) from the OGS, and both would respond to a fire emergency at the OGS.

3.7 Cultural Resources

Detailed information regarding the history and prehistory of the State of Iowa and Iowa counties is available from several on-line and library sources. The homepage of the Office of the State Archaeologist (<http://www.uiowa.edu/~osa/archaeology.htm>) includes links that describe salient features of the region's history and prehistory (OSA 2002). Specific information about Wapello County is available from the University of Iowa/Wapello County extension services (<http://www.extension.iastate.edu/wapello/>) (University of Iowa 2003). The most detailed site-specific information regarding cultural resources in the immediate vicinity of the Proposed Action is found in the 1977 Draft Environmental Impact Statement (EIS) for construction of the OGS, Appendix A, Archeological Investigations in the Proposed Area of the Ottumwa Generating Station Chillicothe, Iowa (EPA 1977), which is incorporated into this EA by reference.

In response to DOE's request for an opinion regarding the presence of cultural or historic resources at the site of the Proposed Action, the SHPO advised DOE that a Phase 1 archaeological survey previously conducted on the entire OGS property identified 15 archaeological sites (Appendix B). Of these 15 sites, 10 were not considered eligible for listing on the National Register of Historic Places, four were mitigated at the time of OGS plant construction and are no longer considered eligible for listing, and one was considered still eligible for listing. As recommended by the SHPO, DOE contacted the Office of the State Archaeologist regarding the site that was still eligible for listing. The Office of the State Archaeologist conducted an Iowa site file search (Appendix B), which indicated that the one site still considered eligible by the SHPO for listing was not within or near the location of DOE's Proposed Action.

However, the report from the Office of the State Archaeologist identified two other sites within or near the Proposed Action location that were not cited in SHPO's response to DOE. One of these two sites no longer exists. It was excavated and removed prior to OGS plant construction and is described in the original OGS EIS (EPA 1977). The second site was discovered during a Phase 1 cultural resource investigation for construction of Power Plant Road in 1996. The SHPO does not consider this site as eligible for listing on the National Register of Historic Places (Jones 2003).

3.8 Land Use

Land use in Wapello County, the site of the proposed new facilities, and in the counties surrounding Rathbun Lake is predominantly agricultural. During the 5-year period from 1997 to 2001, the percent of the land in farmland use for the seven counties in the region was as follows: Wapello County, 87 percent; Clarke County, 94 percent; Lucas County, 90 percent; Monroe County, 93 percent; Decatur County, 94 percent; Wayne County, 93 percent; and Appanoose County, 84 percent (Iowa Agricultural Statistics 2002). Land in the area immediately surrounding the OGS site is currently used for agriculture or for plant support activities. The closest resident occupies a farmhouse about 0.4 kilometer (0.25 mile) from the plant gate. The Wapello County Conservation Board's approximately 57,000-square-meter (14-acre) McNeese Wildlife Area, which supports upland hunting, is located less than a mile southwest of the OGS.

3.9 Noise

Noise can be defined as any sound that is undesirable because it interferes with speech, communication, or hearing; is intense enough to damage hearing; or is otherwise loud, discordant, or disagreeable to some receptors. Depending upon the loudness and the duration of a noise, its effects can range from temporary annoyance to permanent hearing impairment or loss. Ambient noise is the collective sound resulting from the omnipresent background noise associated with a given environment. It is usually a composite of many sounds from many sources. An environment's ambient noise serves as a point of departure and comparison for analyzing the impact of a new or additional noise on a sensitive environment.

Noise is generally considered to be low when its ambient levels are below 45 A-weighted decibels (dBA), moderate in the 45- to 60-dBA range, and high above 60 dBA. Typical wilderness area ambient sound is about 35 dBA, typical rural residential levels are about 40 dBA, and typical urban residential sound levels on a busy street are about 68 dBA (outdoor day-night average sound levels) (Suter 1991). Noise levels above 45 dBA at night can result in the onset of sleep interference; above 70 dBA, sleep interference effects become considerable.

Different environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than would be expected for commercial, industrial, or construction zones. Many Federal agencies use average day-night sound levels as guidelines for land-use compatibility and to assess the impacts of noise on people. For example, the EPA uses an average day-night sound level of 55 dBA as an outdoor goal for protecting public health and welfare in residential areas (EPA 1974, 1978). Some Iowa counties are considering noise ordinances modeled from Missouri county ordinances. These ordinances would limit noise to a certain decibel level and to a certain time frame. This type of ordinance has the potential to affect farm practices during planting and harvest, at times when farmers are working late into the night. Potential sources of noise include grain dryers, tractors, combines, and other farm implements and structures.

The Proposed Action would occur in two areas with different ambient noise environments. At the OGS plant, the ambient noise environment is dominated by operational noise from OGS plant operations. In agricultural areas of the Rathbun Lake watershed, ambient noise levels are dominated by seasonally variable noises associated with agricultural activities: planting, cultivation, pesticide and fertilizer application, and harvesting. Where and when agricultural operations are not in progress, ambient noise levels would be typical of average outdoor noise levels in rural areas. Background sounds are produced

mostly by natural phenomena (wind, rain, and wildlife) and by light to moderate road traffic. DOE estimates that ambient noise levels associated with these sources in the agricultural areas of the Rathbun Lake watershed would range from 38 to 55 dBA. The ambient noise associated with intermittent traffic can be highly variable in that it is significantly influenced by vehicle and engine type, number of tires, road-surface conditions, and the condition of exhaust systems. Background noise levels associated with these sources would range from 60 to 80 dBA. DOE estimates that in the study area, there are no sustained outdoor ambient noise levels above 85 dBA, the level considered harmful by the U.S. Department of Health and Human Services, National Institute of Occupational Safety and Health.

3.10 Aesthetics

Figure 3 illustrates the OGS main plant from the west as seen from the location of the proposed new facilities. Figure 10 shows the OGS substation, which is immediately south of and adjacent to the OGS main plant, and illustrates the typical surrounding landscape. The landscape surrounding the plant is generally flat and featureless except for trees that have been maintained near the periphery of the plant property or that grow along the Des Moines River or Avery Creek embankments. Except for tree lines and occasional low hills, there is a generally unobstructed view of flat to gently rolling agricultural land from the edge of the plant property to the horizon. From beyond the boundary of the plant property, trees generally serve to screen the OGS plant from ground-level view. As shown in Figure 11, the dominant aspects of the plant that are visible at ground level from beyond the tree lines are the 180-meter (600-foot) high stack, the top of the OGS main plant, which is about 80 meters (250 feet) high, and the steam plume from the cooling towers.

3.11 Socioeconomics

Wapello County, the site of the new construction under the Proposed Action, and the counties where switchgrass would be harvested under the Proposed Action are all non-metropolitan rural counties.

Wapello County comprises seven incorporated communities, including Chillicothe, the smallest, and Ottumwa, the largest, and their surrounding rural areas. From 1990 to 2000, the county's population increased only 1.0 percent compared to a statewide increase of 5.4 percent over the same period. Compared to the state, Wapello County has a lower percentage of young people (19 or younger) and a higher percentage of older people (65+ years). The 2000 census reported that the county had a higher unemployment rate (4.1 percent) than the statewide rate of 2.1 percent. Of the 16,493 persons reporting themselves as employed in Wapello County in 2000, the largest percentage (24.7 percent) said they were employed in production, transportation, and material moving occupations.

3.12 Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, state, local, and tribal programs and policies.



Figure 10. OGS Substation and Typical Surrounding Landscape



Figure 11. OGS Plant from the East

In February 1994, President Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 Fed. Reg. 7629 (1994)). This Order directs Federal agencies to incorporate environmental justice as part of their missions. As such, Federal agencies are specifically directed to identify and address as appropriate disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.

The CEQ has issued guidance to Federal agencies to assist them with their NEPA procedures so that environmental justice concerns are effectively identified and addressed (CEQ 1997). In this guidance, the Council encouraged Federal agencies to supplement the guidance with their own specific procedures tailored to particular programs or activities of an agency. DOE has prepared a document titled *Draft Guidance on Incorporating Environmental Justice Considerations into the Department of Energy's National Environmental Policy Act Process* (DOE 2000). DOE's draft guidance is based on Executive Order 12898 and the CEQ environmental justice guidance. Among other things, the DOE draft guidance states that even for actions that are at the low end of the sliding scale with respect to the significance of environmental impacts, some consideration (which could be qualitative) is needed to show that DOE considered environmental justice concerns. DOE needs to demonstrate that it considered apparent pathways or uses of resources that are unique to a minority or low-income community before determining that, even in light of these special pathways or practices, there are no disproportionately high and adverse impacts on the minority or low-income population.

Table 3 illustrates the high degree of racial homogeneity in Iowa and in the counties where the Proposed Action would occur. White residents account for 96.3 to 98.8 percent of the population in seven counties in this area, compared to 93.9 percent statewide, and 75.1 percent nationally. Hispanic/Latino and African-American/Black are the two largest minority groups, but neither of these two groups account for more than 4 percent of the population, and in most Iowa census areas they represent less than 2 percent of the population. Nationally, the Hispanic/Latino and African-American/Black populations represent 12.5 percent and 12.3 percent of the population, respectively. Native Americans represent 0.3 percent of the population in Wapello County and statewide.

Economically, Wapello County and the counties surrounding Rathbun Lake are among the poorest in Iowa. All seven counties have median household incomes below the state average, and all but one have a higher percent of families below the poverty level than does the state overall (Table 3). The Bureau of Economic Analysis reports that in 2000, Wapello County, the site of the proposed new construction, had a per capita personal income (PCPI) of \$22,110. This PCPI ranked 80th among the state's 99 counties and was 84 percent of the state average and 75 percent of the national average. In 1990, Wapello County's PCPI ranked 62nd in the state, indicating a significantly declining trend in the county's comparative PCPI. This unfavorable trend is further seen in the county's 3.6 percent average annual growth rate of PCPI over the past 10 years, compared to 4.3 percent statewide and 4.2 percent nationwide.

4.0 ENVIRONMENTAL IMPACTS

Impacts from the Proposed Action are described in Section 4.1; impacts under the No Action Alternative are described in Section 4.2.

The Proposed Action would result in impacts from construction of switchgrass feedstock storage, handling, and conveying systems and from switchgrass co-fire tests that would be conducted at the OGS. The Proposed Action would also result in impacts from agricultural activities in the 16 to 28 square kilometers (4,000 to 7,000 acres) needed to supply switchgrass for Phase 2 testing. These activities